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Evaluating the Economic Structure of a Rural Area

DEMONSTRATION OF
AN INPUT-OUTPUT ANALYSIS

ECONOMIC RESEARCH SERVICE
U.S. DEPARTMENT OF AGRICULTURE

PREFACE

Economic growth in multicounty areas, developing new ways of using area resources, and prospects for improved income positions for rural people, are subjects for research in the Economic Development Division of USDA's Economic Research Service. Tasks in the Division range from preparing descriptive reports and analytic area profiles to applying econometric growth models and linear programs. This study describes the economic structure of a 10-county area in North Carolina in terms of an input-output matrix based on secondary data. This structure is presented in the context of growth trends and related background information. Interpretation of these descriptive relationships help understand problems of economic growth. Various data sources were drawn upon to estimate the economic structure. Most of these data are as of 1958-63. The structure is presented as of 1960.

The economic framework presented here is considered as an early step rather than a final product. Studies are in process in the Economic Research Service (1) to improve the imputational procedures for estimation of inter-industry structure by providing more detail with respect to sectors and their linkages; (2) to use recently available secondary data relating particularly to income, employment, and manufacturing plant location in the imputational process; (3) to incorporate resources other than labor, such as capital flows; (4) to make explicit the connections between economic structure and changes in demographic characteristics; and (5) to incorporate optimizing procedures which would indicate likely public and private policies needed to maximize attainment of local goals with respect to growth and to expanding economic opportunity.

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HIGHLIGHTS

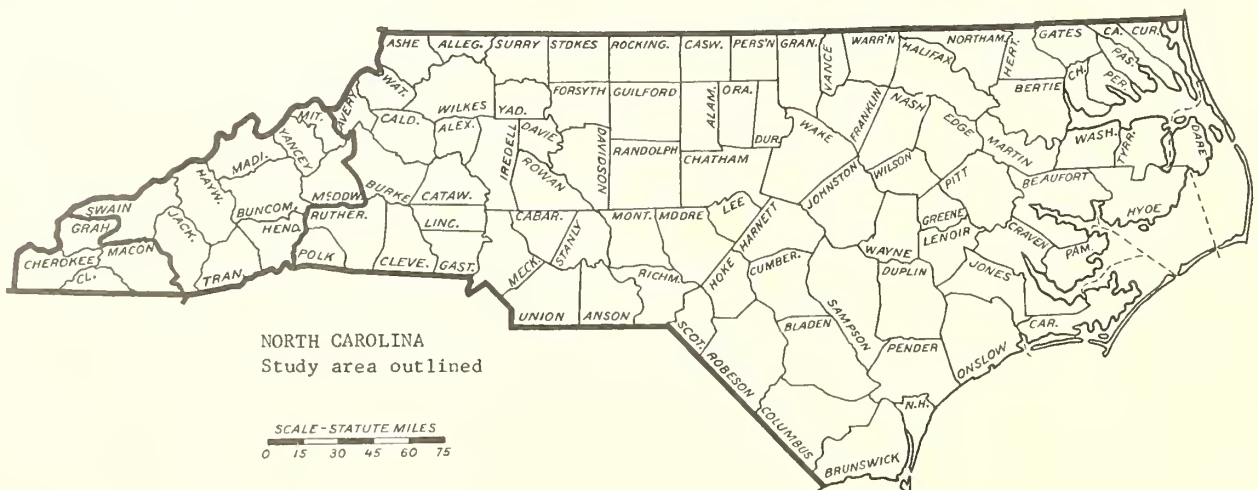
There are various ways to aid lagging rural economies, and different techniques to determine which will work best. This report describes one method applied to a 10-county area near Asheville, N.C., with a predominantly rural and low-income population. Estimates of apparent flow of goods and services among local industries point to prospects for expanding job opportunities and improving incomes.

A large proportion of workers in the area are in occupations which are considered slow-growing occupations in the national labor force--farmers, operatives, and laborers. Similarly, local industry includes a large proportion of output in sectors which are considered slow-growing industries in the national market--agriculture, wood products, textile products, and railroad transportation.

Gross Area Product in 1960 was estimated at \$562 million. Most of the value originated in agriculture, construction, textile mill products, chemicals and allied products, other nondurable goods, and wholesale and retail trade.

Efforts to expand local income and employment in the Asheville, N.C., area through exports of local products outside the area would have the greatest return in apparel and other segments of the textile industry, if a national market for these products were developed. Additional exports of \$1 million would lead to \$4.5 million of local business activity and to more than 300 new jobs. The agricultural multipliers are nearly as large, but with a different employment mix of relatively more laborers and fewer skilled craftsmen and operatives than in the apparel and textile industry. Small dollar and job multipliers were associated with expanding export sales from mining activity as a consequence of relatively large import requirements for materials and services.

Consequently, industries with the greatest growth potential for the area include agriculture, textile products, and chemical products. However, only the latter has been a growing industry at the national level--implying a difficulty in finding national markets for products in which the area shows the greatest local advantage.



EVALUATING THE ECONOMIC STRUCTURE OF A RURAL AREA

Demonstration of an Input-Output Analysis*

INTRODUCTION

Current emphasis on area development has exemplified the need for empirical knowledge of the interactions within and among area economies. Policymakers need to know the nature of program impacts and the possible effect of their decisions before as well as after implementation. The business community needs to know the potentials for community and area growth to make wiser investment and planning decisions.

The interindustry framework provides a powerful approach to area economic structural analysis. When implemented empirically, such a framework provides an analytic data system which indicates in a consistent manner the levels of the various area economic activities as well as their economic interrelationships. Data arrayed in an interindustry framework provide much of the empirical input required for application of a wide variety of analytic techniques, including input-output analysis, mathematical programming, and simulation.

The Economic Research Service is developing an extended interindustry interactions information system designed to be implemented largely with secondary data for the rapid low-cost calculation of sector interrelationships. When fully developed, the system will provide a description of economic structure which will be a useful detailed evaluation of development potentials of specific multicounty areas. A byproduct of this effort has been the construction and implementation of a simple model which illustrates many of the characteristics of the more comprehensive system. This report summarizes the results of this illustrative model as applied to a 10-county area centered around Asheville.

To provide an understanding of the structure of the Asheville area economy, these results are preceded by related background information. The report describes the generally low level of area income and the distribution which results in a large proportion of low-income families. The income level and distribution problem is explained in terms of local commitments to low-wage occupations and to nationally declining industries. Using interindustry flow analysis, prospects are appraised for creating new jobs and improving the area income picture through expanding markets for local products.

* This approach to the description of economic areas was initiated and developed under the auspices of Dr. H. Albert Green - formerly, Leader, Economic Structures Group, Economic Development Division, Economic Research Service; currently, Economist, Center for Rural Analyses of the University of Rochester, Arlington, Virginia. Dr. Green gratefully acknowledges the assistance of Mindaugas F. Petrulis, Econ. Devl. Div., Econ. Res. Serv., USDA.

BACKGROUND ON THE ASHEVILLE AREA

Income

Selected income statistics for the Asheville area, the State of North Carolina, and the United States are presented in table 1. ^{1/} The distribution of families by 1959 money income class for the area is similar to that of the State. Compared with the Nation, however, the area has a definite prevalence of low-income households. This low-income characteristic underlies the per capita as well as median income differences of the area and State, compared with the United States.

Employment

Explanations of income differentials can often be found in an examination of employment characteristics. Compared with either the Nation or the State, employment in the Asheville area is a slightly smaller proportion of the total population (table 2). The age distribution of the population varies little among the three areas. This implies that the lack of employment opportunities and appropriate labor skills, rather than working age population, are factors underlying the relatively low employment relationships.

Employment may be classified in a number of ways. Two of the most important are by occupation and by industry.

Occupational distribution.--Table 3 compares the occupational distribution of 1960 civilian employment in the Asheville area with the State and the Nation. Compared with the State, the area has a high proportion of professional, technical, and service workers, and a low proportion of farmers and farm laborers. Compared with the United States, however, the proportion of farmers is high. Operatives also appear plentiful, while nonfarm managers, clerical and salesworkers, craftsmen, and service workers are less abundant. Area employment of female workers tends to be proportionately the same as in the Nation but relatively less than in the State as a whole.

Area distribution of employment by occupation and sex shifted during 1950-60, relative to the United States (table 4). Total area employment, male and female, was 105,929 for 1950 and 110,008 for 1960 (columns 1 and 2). The 1960 total employment in the area would have been 122,328 instead of 110,008, if the area employment in each occupation had maintained its share of national total employment (column 3). This difference of approximately 12,000 employees is partially the result of the area's work force having been employed in occupations in 1950 which had poor growth potentials, such as farmers and farm managers, operatives and kindred workers, and farm and nonfarm laborers (column 4). Despite the relative growth tendencies of professional, technical and kindred workers, and of female clerical and service workers, the net effect of occupational composition on the area was a relative decrease of 6,889 workers.

^{1/} The Asheville area comprises Buncombe, Haywood, Henderson, Jackson, Madison, McDowell, Mitchell, Swain, Transylvania, and Yancey Counties.

Table 1.--Distribution of families by 1959 money income class and 1959 money income: Asheville, 10-county area, North Carolina, and United States, 1960

Subject	Region			
	Asheville 10-county area	North Carolina	United States	
Families and unrelated individuals:				
Aggregate income (mil. dol.)	414	5,703	331,697	
Per capita income (dol.)	1,294	1,252	1,850	
Median income (dol.)				
Families	3,897	3,956	5,660	
Unrelated individuals ^{1/}	1,020	1,074	1,596	
	<u>Number</u> - - - - <u>Percent distribution</u> - - - -			
Families of two or more persons: by income class:				
Under 1,000	9,088	11.1	11.6	5.6
\$1,000 - \$1,999	10,363	12.7	12.3	7.5
\$2,000 - \$2,999	11,115	13.6	13.2	8.3
\$3,000 - \$3,999	11,472	14.0	13.4	9.5
\$4,000 - \$4,999	9,671	11.8	11.8	11.0
\$5,000 - \$5,999	8,451	10.4	10.3	12.3
\$6,000 - \$6,999	6,225	7.6	8.0	10.7
\$7,000 - \$7,999	4,537	5.6	5.7	8.6
\$8,000 - \$8,999	3,256	4.0	4.1	6.6
\$9,000 - \$9,999	2,068	2.5	2.5	4.9
\$10,000 - \$14,999	3,818	4.7	4.7	10.5
\$15,000 - \$24,999	1,086	1.3	1.5	3.3
\$25,000 and over	565	.7	.7	1.3
Total	81,715	100.0	100.0	100.0

^{1/} Weighted sum of county medians.

Source: U.S. Bureau of the Census. U.S. Census of Population: 1960.

Note: Detail may not add to total due to rounding.

Table 2.--Employment, labor force, and population: Asheville 10-county area, North Carolina, and United States, 1960

Item	Asheville 10-county area		North Carolina		United States	
	Number	Percent of total population	Number	Percent of total population	Number	Percent of total population
			<u>1,000</u>		<u>1,000</u>	
Employment:						
Female.	35,876	11.2	564	12.4	21,201	11.8
Total	110,008	34.3	1,605	35.2	66,373	37.0
Labor force:						
Female.	38,082	11.9	600	13.2	22,410	12.5
Total	115,671	36.1	1,754	38.5	69,877	39.0
Population:						
18 to 64 years:						
Female.	91,359	28.5	1,261	27.7	50,349	28.1
Total	175,083	54.7	2,469	54.2	98,562	55.0
All ages:						
Female.	164,029	51.2	2,309	50.7	90,992	50.7
Total	320,360	100.0	4,556	100.0	179,323	100.0

Source: U.S. Bureau of the Census. U.S. Census of Population: 1960.

Table 3.--Occupational distribution of civilian employment: Asheville 10-county area, North Carolina, and United States, 1960

Occupation	Asheville area				North Carolina		United States	
	Male	Female	Male	Female	Male	Female	Male	Female
	Number		Percent		Percent		Percent	
Professional, technical & kindred workers	5,288	4,546	7.1	12.7	6.2	10.9	10.3	13.0
Engineers, technical	721	0	1.0	.0	.8	*	2.0	*
Medical & other health workers	760	1,232	1.0	3.4	.8	2.7	1.2	3.7
Teachers, elem. and secondary schools.	598	2,092	.8	5.8	.8	5.4	1.0	5.2
Other professional, technical & kindred workers.	3,209	1,222	4.3	3.4	3.9	2.7	6.1	4.1
Farmers and farm managers.	6,474	313	8.7	.9	11.1	1.5	5.5	.6
Managers, officials, & prop., excl. farm	6,575	1,155	8.9	3.2	9.0	2.6	10.7	3.7
Clerical and kindred workers	3,321	6,824	4.5	19.0	4.7	18.3	6.9	29.7
Secretaries, stenographers, & typists	n.a.	2,213	n.a.	6.2	.1	6.3	.2	10.3
Other clerical workers	n.a.	4,611	n.a.	12.9	4.6	12.0	6.7	19.4
Salesworkers	4,256	2,645	5.7	7.4	6.5	6.3	6.9	7.8
Craftsmen, foremen, and kindred workers.	13,240	394	17.9	1.1	17.4	1.0	19.5	1.2
Foremen (n.e.c.)	1,889	n.a.	2.6	n.a.	2.5	.4	2.5	.4
Mechanics and repairmen.	3,456	n.a.	4.7	n.a.	4.8	.1	5.1	.1
Metal craftsmen, except mechanics. . .	890	n.a.	1.2	n.a.	1.1	*	2.5	.1
Construction craftsmen	4,833	n.a.	6.5	n.a.	5.9	.1	5.5	.1
Other craftsmen.	2,172	n.a.	2.9	n.a.	3.2	.4	3.9	.5
Operatives and kindred workers	19,040	9,724	25.7	27.1	22.9	28.4	19.9	15.4
Drivers and deliverymen.	4,282	0	5.8	.0	5.6	.2	5.2	.2
Other operatives	14,758	9,724	19.9	27.1	17.3	28.2	14.7	15.2
Private household workers.	207	2,959	.3	8.2	.2	12.2	.1	7.9
Service workers, excl. private household	3,917	4,371	5.3	12.2	4.8	9.7	6.0	13.4
Protective service workers	873	0	1.2	.0	1.1	.1	1.5	.1
Waiters, bartenders, cooks, and counter workers.	643	1,747	.9	4.9	.7	3.7	1.2	5.7
Other service workers.	2,401	2,624	3.2	7.3	2.9	5.9	3.3	7.6
Farm laborers and farm foremen	2,223	316	3.0	.9	5.1	3.6	2.8	1.1
Laborers, except farm and mine	5,484	161	7.4	.4	7.4	.7	5.9	.5
Occupation not reported.	4,020	2,468	5.4	6.9	4.5	4.9	4.5	5.7
Total.	74,045	35,876	100.0	100.0	100.0	100.0	100.0	100.0
Addendum: Percent of total employed by sex	---	---	67.4	32.6	64.9	35.1	67.2	32.8

* Less than 0.05 percent

n.a. Not available.

Source: U.S. Bureau of the Census. U.S. Census of Population: 1960.

Table 4.--Employment and relative shift in employment by occupation and sex: Asheville 10-county area, 1950-60

Occupation	Sex	Total employment		Relative shift in employment, 1950-60					
		1950	1960	National		Occupational		Regional	
		(1)	(2)	growth	effect	composition	effect	share	change
				(3)	(4)	(5)	(6)	(7)	(8)
Professional, technical, and kindred workers.	M	3,925	5,238	608		1,386		-631	1,363
	F	3,926	4,546	608		1,006		-944	620
Farmers and farm managers	M	14,246	6,474	2,206		-8,346		-1,632	-7,772
	F	226	313	35		-33		85	87
Managers, officials, and prop., excl. farm.	M	5,924	6,575	917		-544		278	651
	F	1,033	1,155	160		-9		-29	122
Clerical and kindred workers.	M	2,992	3,321	463		-47		-87	329
	F	4,557	6,824	705		1,391		171	2,267
Salesworkers.	M	4,132	4,256	640		13		-529	124
	F	2,241	2,645	347		202		-145	404
Craftsmen, foremen, and kindred workers	M	11,777	13,240	1,823		-422		62	1,463
	F	310	394	48		-27		63	84
Operatives and kindred workers.	M	17,567	19,040	2,720		-1,666		419	1,473
	F	6,945	9,724	1,075		-547		2,251	2,779
Private household workers	M	222	207	34		-71		22	-15
	F	3,230	2,959	500		288		-1,059	-271
Service workers, excluding private household.	M	3,973	3,917	615		-246		-425	-56
	F	3,424	4,371	530		1,120		-703	947
Farm laborers and farm foremen.	M	5,947	2,223	921		-3,234		-1,411	-3,724
	F	749	316	116		-462		-87	-433
Laborers except farm and mine	M	6,734	5,484	1,042		-1,675		-617	-1,250
	F	149	161	23		-44		33	12
Members of the armed forces	M	91	87	14		49		-67	-4
	F	n.a.	n.a.	n.a.		n.a.		n.a.	n.a.
Occupation not reported	M	912	4,020	141		2,890		77	3,108
	F	697	2,468	108		2,139		-476	1,771
Total, all occupations.	M	78,442	74,132	12,144		-11,913		-4,541	-4,310
	F	27,487	35,876	4,255		5,024		-890	8,389

1/ "M" denotes male; "F" denotes female.

2/ Column 3 indicates 1950-60 area employment change in each occupation required to maintain area share of national total employment.

3/ Column 4 indicates 1950-60 area employment change in each occupation required to maintain area share of national employment in each respective occupation less national growth effect.

4/ Column 5 indicates actual 1950-60 area employment change in each occupation less the sum of the national growth and occupational composition effects.

5/ Column 6 indicates actual 1950-60 area employment change in each occupation; the total change is equal to the sum of the national growth, the occupational composition, and the regional share effects.

Source: U.S. Bureau of the Census. U.S. Census of Population: 1950 and 1960.

In effect, had area employees retrained and had job opportunities materialized as they had in the Nation as a whole, total area employment would have been 115,439 instead of 110,008, as reported; this relative difference of 5,431 employees is indicated by the regional share effect (column 5). It is particularly evident in the less rapid growth of the area's professional, technical and kindred workers, female service workers, and in the more rapid decline of area farmers and farm managers, male clerical and service workers, and farm and non-farm laborers. The substantial inability of the area economy to make internal employment adjustments during 1950-60 implies a heavy out-migration of workers and their families. This indeed was the case: net out-migration of area population during the 10-year period was 40,883 persons.

Industrial distribution.--The industrial distribution of 1960 civilian employment for the Asheville area is compared with the State and the Nation in table 5. The proportion of construction and manufacturing workers is relatively high, and the proportion of transportation, communication and utilities, and finance, insurance, and real estate workers is relatively low. The Asheville area has proportionately more employment than the State in mining, retail trade, and welfare and medical services, and proportionately less in agriculture. When the area is compared with the Nation, agriculture is more important, and retail trade and services relatively less important. The importance of construction results from the 1960 work on Interstate Highway 40 in the area; the importance of manufacturing is associated with the area production of furniture, lumber and wood products, chemicals and allied products, textile products, and other non-durable goods. 2/

Area employment by industry has shifted during 1950-60 relative to the rest of the Nation (table 6). The national growth effect (column 3) shows the change in employment which would have occurred if each area industry had kept pace with the overall growth of national employment during the 10-year period. If the area's share of national employment had been maintained, total area employment in 1960 would have been 122,328 instead of 110,008. 3/

Much of the implied shortfall in employment of 12,000 workers can be attributed to the local 1950 commitment to slower growing industries. Although partially offset by the growth tendencies of public education and medical and other professional services, the negative influence of agriculture, furniture, lumber and wood products, textile mill products, railroad transportation, and other slow growth (or declining) industries was enough to result in a negative cumulative industry mix effect (column 4) of 10,807. In effect, had the area's industries had employment growth as had their counterparts throughout the Nation in that decade, or had each area industry maintained its share of national employment in that industry, total area employment in 1960 would have been 111,521 instead of 122,328 (column 1 plus column 3 and 4, table 6).

2/ Includes tobacco, paper and pulp, petroleum and coal, rubber and plastics, leather, and products of all of these commodities.

3/ This calculation by industry mix is analogous to that indicated above for shifts by occupation and results in the same value.

Table 5.--Industrial distribution of civilian employment: Asheville 10-county area, North Carolina, and United States, 1960

Industry	Asheville area		North Carolina	United States
	Number	Percent	Percent	Percent
Agriculture, forestry, and fisheries. . .	10,192	9.3	13.0	6.7
Agriculture	9,913	9.0	12.8	6.6
Forestry and fisheries.	279	.3	.2	.1
Mining.	732	.7	.2	1.0
Contract construction	7,628	6.9	6.1	5.9
Manufacturing	36,603	33.3	31.7	27.1
Furniture, lumber, and wood products. .	4,887	4.4	5.0	1.7
Primary metal products.	61	.1	.2	1.9
Fabricated metal products	240	.2	.4	2.0
Machinery, except electrical.	500	.5	.8	2.4
Electrical machinery and equipment. . .	1,642	1.5	1.6	2.3
Motor vehicles and equipment	37	*	.1	1.3
Transportation equipment, excluding M.V.	524	.5	.2	1.5
Other durable goods	1,118	1.0	.8	2.1
Food and kindred products	1,422	1.3	2.1	2.8
Textile mill products	11,129	10.1	3.8	1.5
Apparel and fabric textile products . .	2,148	2.0	2.1	1.8
Printing and publishing	740	.7	.8	1.8
Chemicals and allied products	4,583	4.2	.8	1.3
Other nondurables (incl. not spec. mfg.)	7,572	6.9	2.9	2.7
Transportation, communication, and utilities:	4,825	4.4	4.6	7.0
Railroads and railway express	943	.9	.7	1.5
Trucking service and warehousing. . . .	1,345	1.2	1.5	1.4
Other transportation.	929	.8	.7	1.4
Communications.	868	.8	.8	1.3
Utilities and sanitary services	740	.7	.9	1.4
Wholesale and retail trade.	18,084	16.4	16.0	18.2
Wholesale trade	2,723	2.5	2.7	3.4
Food and dairy products stores.	2,796	2.5	2.5	2.6
Eating and drinking places.	2,130	1.9	1.7	2.8
Other retail trade.	10,435	9.5	9.1	9.4
Finance, insurance, and real estate . . .	2,447	2.2	2.7	4.2
Services.	25,488	23.1	22.6	25.9
Business services	455	.4	.4	1.2
Repair services	1,558	1.4	1.3	1.3
Private households.	3,667	3.3	4.8	3.0
Other personal services	3,661	3.3	2.9	3.0
Entertainment and recreation services .	518	.5	.5	.8
Educational services: Government . . .	4,117	3.7	4.0	3.9
Educational services: Private.	1,262	1.1	1.0	1.3
Welfare, religious, and nonprofit organs.	1,509	1.4	1.0	1.3
Hospitals	3,226	2.9	2.0	2.6
Other professional and related services	2,269	2.1	1.6	2.5
Public administration	3,246	3.0	3.1	5.0
Industry not reported	3,922	3.6	3.1	4.0
Total, all industries	109,921	100.0	100.0	100.0
Addendum: Self-employed workers:				
Agriculture	6,863	6.2	7.8	4.0
Nonagriculture industries	9,555	8.7	7.3	8.3

Source: U.S. Bureau of the Census. U.S. Census of Population: 1960.

Table 6.--Employment and relative shift in employment by industry: Asheville
10-county area, 1950-60

Industry	Total employment		Relative shift in employment, 1950-60			
	1950	1960	National growth effect	Industry mix effect	Regional share effect	Total change
	(1)	(2)	(3) 1/	(4) 2/	(5) 3/	(6) 4/
Agriculture	21,466	9,913	3,323	-11,580	-3,296	-11,553
Forestry and fisheries	224	279	35	-92	112	55
Mining	776	732	120	-351	187	-44
Contract construction	7,253	7,628	1,123	-370	-378	375
Furniture, lumber, and wood products	5,811	4,887	900	-1,500	-324	-924
Primary metal products	31	61	5	-3	28	30
Fabricated metal products	176	240	27	69	-32	64
Machinery (except electrical)	154	500	24	9	313	346
Electrical machinery and equipment	33	1,642	5	24	1,380	1,609
Motor vehicles and equipment	39	37	6	-7	-1	-2
Transportation equipment, excluding M.V.	14	524	2	12	496	510
Other durable goods	785	1,118	121	43	169	333
Food and kindred products	940	1,422	146	126	210	482
Textile mill products	9,525	11,129	1,475	-3,673	3,802	1,604
Apparel and fabric textile products	1,031	2,148	160	-67	1,024	1,117
Printing and publishing	721	740	112	129	-222	19
Chemicals and allied products	2,606	4,583	403	408	1,166	1,977
Other nondurables (incl. not spec. mfg.)	5,821	7,572	901	-396	1,246	1,751
Railroads and railway express	1,628	943	252	-776	-161	-685
Trucking service and warehousing	1,055	1,345	163	150	-23	290
Other transportation	1,213	929	188	-154	-318	-284
Communications	836	868	129	0	-97	32
Utilities and sanitary services	837	740	130	-9	-218	-97
Wholesale trade	2,148	2,723	333	-82	324	575
Food and dairy products stores	2,813	2,796	435	-491	39	-17
Eating and drinking places	1,972	2,130	305	-178	31	158
Other retail trade	8,838	10,435	1,368	169	60	1,597
Finance, insurance, and real estate	1,567	2,447	242	389	249	880
Business service	211	455	33	208	3	244
Repair services	1,710	1,558	265	-451	34	-152
Private households	4,167	3,667	645	60	-1,205	-500
Other personal services	3,975	3,661	615	-445	-484	-314
Entertainment and recreation services	664	518	103	-92	-157	-146
Educational services: Government	3,154	4,117	488	1,564	-1,089	963
Educational services: Private	1,058	1,262	164	486	-446	204
Medical and other professional services	5,402	7,004	836	2,104	-1,338	1,602
Armed forces	91	87	14	49	-67	-4
Public administration	3,376	3,246	523	402	-1,055	-130
Industry not reported	1,808	3,922	280	3,509	-1,675	2,114
Total	105,929	110,008	16,399	-10,807	-1,513	4,079

1/ Column 3 indicates 1950-60 area employment change in each industry required to maintain area share of national total employment.

2/ Column 4 indicates 1950-60 area employment change in each industry required to maintain area share of national employment in each respective industry less national growth effect.

3/ Column 5 indicates actual 1950-60 area employment change in each industry less the sum of the national growth and industry mix effects.

4/ Column 6 indicates actual 1950-60 area employment change in each industry; the total change is equal to the sum of the national growth, the industry, and the regional share effects.

Source: U.S. Bureau of the Census. U.S. Census of Population: 1950 and 1960.

The difference between the area's "imputed" 1960 employment of 111,521 persons and the reported 110,008 persons is a result of some area industries expanding at a slower rate (or declining at a faster rate) than their counterparts in the Nation as a whole. This negative regional share effect (column 5) of 1,513 was largely the relative employment losses in education, medical and other professional services, domestic services, and public administration, as well as the more rapid decline of employment in agriculture, construction, furniture, lumber and wood products, nonhighway transportation, utilities, and recreational services.

It may appear that, despite absolute growth in employment, the area did rather poorly during the 1950's. However, since much of the area's agricultural decline has already occurred, and since employment gains have been made in industries facing more elastic demand curves, there may be a more promising future for the area. 4/ In addition to increasing its share of textile and apparel manufacturing, employment gains were made in the manufacture of electrical machinery, chemicals and allied products, and other nondurable goods. Moreover, the expanding share of nonfood-oriented retail trade and of medical and other professional services reflects the area's movement away from a farm-oriented economy.

THE INTERINDUSTRY TRANSACTIONS OF THE ASHEVILLE AREA

While the distribution of employment gives some indication of structural linkage, a more precise view is afforded by the interindustry transactions matrix. Such a tabulation shows the dollar value of sales and purchases of the various industries.

The Gross Area Product for the Asheville area in 1960 was \$562.1 million (table 7). 5/ This GAP comprised personal consumption expenditures of \$438.0 million, gross private fixed capital formation of \$73.3 million, local government purchases of \$26.9 million, and nonlocal government purchases, inventory change, and net exports of \$25.6 million.

Associated with this GAP is an estimated gross output totaling almost \$1.8 billion (table 8). In obtaining this output, the area agriculture, construction, textile mill products, chemicals and allied products, other nondurable goods, 6/ and wholesale and retail trade sectors were particularly important.

4/ Industries and areas with elastic product demands face mixed advantages. While they tend to gain more than those facing inelastic markets from the general rise in per capita income, they also are more susceptible to cyclical fluctuations in the general economy.

5/ All 1960 dollar figures are expressed in 1958 prices.

6/ Other nondurable goods include paper and allied products, petroleum and coal products, rubber and miscellaneous plastic products, tobacco manufactures, and nonspecified manufacturing industries.

Table 7.--Interindustry transactions in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960

[For the distribution of output of an industry, read the row for that industry.]
[For the composition of inputs to an industry, read the column for that industry.]

Sector code and title	Agriculture	Forestry and fisheries	Mining	Construction	Furniture, lumber and wood products
	1	2	3	4	5
1. Agriculture	\$29,427	\$ 58	\$ 14	\$ 384	\$ 1,189
2. Forestry and fisheries.	12	3	*	1	2,769
3. Mining.	195	*	1,058	1,226	17
4. Construction.	1,177	*	10	13	70
5. Furniture, lumber, wood products, mfg.	198	*	228	6,788	12,940
6. Primary metal industries, mfg.	3	*	309	5,849	1,160
7. Fabricated metal industries, mfg.	226	*	414	11,477	1,608
8. Machinery, excl. electrical mfg.	393	*	455	1,556	300
9. Elec. mach., equip., and supplies, mfg.	59	*	143	2,862	108
10. Motor vehicles and equipment, mfg.	111	---	22	3	17
11. Transport, equipment, excl. M.V., mfg.	10	4	13	4	40
12. Other durable goods, mfg.	66	1	350	8,308	868
13. Food and kindred products, mfg.	5,696	6	32	153	238
14. Textile mill products, mfg.	101	3	6	8	1,044
15. Apparel, fabricated textile prod., mfg.	84	*	*	3	73
16. Printing, publ., and allied prod., mfg.	29	*	6	30	157
17. Chemicals and allied products, mfg.	2,317	*	205	2,602	1,032
18. Other nondurable goods, mfg.	2,229	10	338	3,487	1,994
19. Transportation and warehousing.	1,562	2	293	3,567	2,143
20. Communications.	254	1	17	205	182
21. Utilities and sanitary services	510	*	237	282	338
22. Wholesale and retail trade.	3,667	4	550	10,327	2,513
23. Finance, insurance, and real estate	5,039	16	1,672	1,227	781
24. Business services	852	12	251	2,162	246
25. Repair services	327	2	63	753	344
26. Nondomestic personal services	13	*	18	58	157
27. Entertainment and recreation services	3	*	2	8	10
28. Medical and educational services, and nonprofit organizations	230	*	14	86	45
29. Other professional and related services	729	9	200	1,711	203
30. Local government enterprises.	3	*	8	25	26
I. Total intermediate inputs.	55,522	131	6,928	65,165	32,612
PY. Participation income	32,087	63	4,046	43,037	16,811
OVA. Other value added <u>1</u> /	9,360	64	6,372	4,579	2,683
FE. Federal Government Enterprises	15	*	5	---	28
NCM. Other noncompetitive imports	484	---	---	---	3
T. Total.	97,468	258	17,351	112,781	52,137

See footnotes at end of table, page 16.

Continued--

Table 7.--Interindustry transactions in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960--Continued

[For the distribution of output of an industry, read the row for that industry.]
[For the composition of inputs to an industry, read the column for that industry.]

Sector code	Primary metal industries	Fabricated metal industries	Machinery excluding electrical	Electrical : machinery, : equipment, : and supplies	Motor : vehicles : and : equipment	Transportation : equipment, : excl. M.V.	Other : durable : goods	Food and : kindred : products
	6	7	8	9	10	11	12	13
1 :	*	1	3	6	*	1	15	13,917
2 :	*	*	*	1	*	*	3	162
3 :	108	2	6	17	1	2	460	34
4 :	6	3	8	21	3	9	17	154
5 :	2	25	20	222	1	68	149	67
6 :	343	1,064	930	2,050	99	488	546	23
7 :	32	258	316	1,170	68	450	417	1,176
8 :	24	197	1,098	618	31	319	252	11
9 :	11	91	357	3,630	28	279	380	25
10 :	4	30	113	75	306	51	46	*
11 :	2	144	69	102	2	1,050	218	1
12 :	17	75	95	720	18	195	1,474	426
13 :	2	13	27	114	2	10	79	7,240
14 :	*	3	3	19	6	6	145	10
15 :	1	3	5	18	7	6	26	88
16 :	2	9	9	35	1	6	46	92
17 :	25	46	35	394	8	47	551	300
18 :	17	90	146	719	36	72	1,031	1,118
19 :	54	81	121	437	21	83	555	1,779
20 :	4	13	41	81	2	26	64	105
21 :	29	27	39	124	5	36	252	234
22 :	44	137	283	950	30	158	625	1,541
23 :	14	54	119	295	7	57	289	427
24 :	6	24	53	332	13	15	158	545
25 :	2	8	14	54	3	4	50	262
26 :	2	11	21	79	1	7	50	54
27 :	*	1	2	8	*	1	4	5
28 :	*	3	6	20	*	6	14	33
29 :	5	20	43	264	11	13	127	435
30 :	1	1	1	3	*	1	9	19
I. :	757	2,434	3,956	12,578	710	3,466	8,052	30,283
PY. :	340	1,181	2,443	7,795	207	2,515	5,329	6,233
OVA. :	124	420	771	2,621	94	354	2,004	4,717
FE. :	1	4	7	55	2	6	22	20
NCM. :	1	-	6	13	*	-	73	999
T. :	1,223	4,039	7,183	23,062	1,013	6,341	15,480	42,252

See footnotes at end of table, page 16.

Continued--

Table 7.--Interindustry transactions in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960--Continued

[For the distribution of output of an industry, read the row for that industry.]
[For the composition of inputs to an industry, read the column for that industry.]

Sector code	: : Textile : and : products	: : Apparel, : fabricated, : textile : products	: : Painting, : publication, : and allied : products	: : Chemicals : and allied : products	: : Other : nondurable : goods	: : Transpor- : tation : and ware- : housing	: : Communi- : cations	: : Utilities : and : sanitary : services
	: : 14	: : 15	: : 16	: : 17	: : 18	: : 19	: : 20	: : 21
1	: 13,313	35	3	123	4,125	38	1	1
2	: 207	170	*	63	5	3	*	*
3	: 178	2	---	2,882	35,936	28	---	1,190
4	: 85	12	25	161	329	1,234	260	382
5	: 78	21	3	205	2,754	26	*	2
6	: 78	3	8	1,579	205	84	19	22
7	: 166	32	17	2,057	2,325	57	3	109
8	: 692	3	24	826	407	143	*	8
9	: 49	2	8	172	237	153	139	12
10	: 9	---	1	9	3	87	---	1
11	: 13	1	10	55	82	462	4	1
12	: 1,102	438	54	1,403	1,064	91	22	23
13	: 463	46	49	2,199	667	142	19	13
14	: 52,879	7,873	11	52	3,057	23	5	2
15	: 4,317	3,268	*	191	272	18	7	*
16	: 159	32	946	350	725	99	123	10
17	: 15,265	261	107	29,565	9,780	89	3	9
18	: 2,828	458	1,293	8,018	32,360	1,815	41	191
19	: 3,451	256	169	3,616	6,356	2,207	43	274
20	: 300	67	91	402	364	269	129	32
21	: 1,389	73	31	1,687	2,127	145	54	2,349
22	: 4,953	859	178	3,201	4,265	1,001	62	169
23	: 1,874	405	334	2,074	2,335	1,712	258	117
24	: 712	106	165	2,952	1,998	254	100	81
25	: 190	27	31	521	415	846	28	28
26	: 341	73	32	239	237	19	9	6
27	: 18	4	3	25	17	28	263	1
28	: 127	20	7	106	143	24	8	9
29	: 590	89	130	2,337	1,602	206	80	66
30	: 31	3	1	44	84	731	3	1,772
I.	: 105,857	14,639	3,731	67,114	114,276	12,034	1,683	6,880
PY.	: 33,779	6,793	2,869	25,048	33,451	14,591	3,509	2,102
OVA.	: 8,577	1,518	510	20,666	27,973	5,787	4,098	4,779
FE.	: 152	40	50	302	286	55	34	273
NCM.	: 1,245	11	1	287	905	526	47	---
T.	: 149,610	23,001	7,161	113,417	176,891	32,993	9,371	14,034

See footnotes at end of table, page 16.

Continued--

Table 7.--Interindustry transactions in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960--Continued

[For the distribution of output of an industry, read the row for that industry.]
[For the composition of inputs to an industry, read the column for that industry.]

Sector code	Wholesale and retail trade	Finance, insurance, and real estate	Business services	Repair services	Nondomestic personal services	Entertain- ment and recreation services	Medical and educ. serv. and nonpro- fit organs.	Other professional and related services
	22	23	24	25	26	27	28	29
1	225	1,751	1	2	3	13	21	7
2	5	2	*	*	1	*	1	1
3	11	137	8	22	---	---	*	15
4	992	4,829	9	195	54	113	834	202
5	225	90	*	2	30	*	4	1
6	29	79	4	2	10	*	*	8
7	283	130	1	201	44	*	33	8
8	313	113	242	292	64	*	7	433
9	261	69	3	306	592	1	41	13
10	266	15	2	1,986	---	---	4	3
11	103	24	5	19	14	1	39	18
12	597	168	139	368	769	102	481	357
13	1,286	154	20	28	91	23	370	117
14	53	38	4	43	257	3	39	17
15	107	45	8	53	328	5	82	32
16	462	494	1,612	704	28	22	458	2,975
17	328	121	15	150	430	2	730	191
18	2,424	640	93	603	612	21	339	239
19	1,304	669	58	186	232	51	359	183
20	1,296	543	618	363	100	28	233	1,154
21	2,453	305	74	313	366	38	512	243
22	2,132	1,171	127	1,273	823	68	544	346
23	8,557	8,695	352	1,114	1,194	376	2,243	1,127
24	3,136	979	84	186	254	99	364	228
25	1,503	308	48	284	239	13	118	110
26	554	249	43	52	560	10	203	121
27	159	89	11	6	4	1,197	113	44
28	102	112	2	12	14	4	286	68
29	2,483	797	66	149	202	78	365	197
30	459	390	3	40	29	1	15	8
I.	32,108	23,206	3,652	8,954	7,344	2,269	8,838	8,466
PY.	64,801	12,193	2,800	5,584	9,680	1,833	17,672	8,905
OVA.	23,498	36,103	510	3,058	1,853	857	1,294	1,185
FE.	1,254	486	190	87	11	3	19	341
NCM.	39	86	*	---	---	94	7	2
T.	121,700	72,074	7,152	17,647	18,888	5,056	27,830	18,899

See footnotes at end of table, page 16.

Continued--

Table 7.--Interindustry transactions in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960--Continued

[For the distribution of output of an industry, read the row for that industry.]
[For the composition of inputs to an industry, read the column for that industry.]

Sector code	Local government enterprises 30	Total intermediate outputs	Personal consumption expenditures	Gross private fixed capital formation	Local government purchases	Federal and State Gov't. activity, net inventory change, and net exports	Total	Total domestic output
1	1	64,678	6,158	---	-19	26,577	32,790	97,468
2	*	3,409	364	---	---	-3,515	-3,151	258
3	64	43,599	405	2,151	504	-29,189	-26,248	17,351
4	773	11,980	---	34,121	9,563	57,265	100,801	112,781
5	*	24,149	4,303	1,244	122	22,339	27,988	52,137
6	1	14,968	43	---	1	-13,723	-13,745	1,223
7	14	23,092	1,321	1,319	36	-21,751	-19,053	4,039
8	1	8,822	790	15,557	183	-18,199	-1,639	7,183
9	1	10,032	7,257	2,683	72	2,924	13,030	23,062
10	8	3,172	19,651	5,089	290	-27,195	-2,159	1,013
11	---	2,510	1,367	1,837	25	599	3,831	6,341
12	4	19,795	5,838	1,425	202	-11,791	-4,315	15,480
13	3	19,302	61,824	---	180	-39,251	22,950	42,252
14	2	65,712	5,281	56	17	78,171	83,898	149,610
15	1	9,048	16,126	---	51	-2,235	13,953	23,001
16	19	9,640	3,463	---	165	-6,632	-2,479	7,161
17	17	64,625	6,706	---	280	42,640	48,792	113,417
18	36	63,298	27,077	85	329	87,609	113,593	176,891
19	49	30,161	12,202	717	266	-10,480	2,832	32,993
20	16	7,000	6,664	313	126	-4,730	2,371	9,371
21	244	14,516	12,977	---	322	-13,758	-482	14,034
22	28	42,029	93,685	5,445	121	-19,410	79,671	121,700
23	76	42,840	71,854	1,782	461	-44,855	29,234	72,074
24	23	16,390	1,689	4	191	-11,121	-9,238	7,152
25	6	6,601	8,905	---	83	2,189	11,046	17,647
26	6	3,225	13,643	---	55	2,006	15,663	18,888
27	*	2,026	4,443	---	-29	-1,385	3,030	5,056
28	*	1,501	24,433	---	158	1,750	26,329	27,830
29	18	13,225	8,129	---	194	-2,645	5,674	18,899
30	*	3,711	598	---	4	-1,210	-608	3,103
I.	1,411	645,056	427,196	73,828	13,953	40,994	554,359	1,199,415
PY.	543	363,204	5,264	---	12,631	---	17,895	386,099
OVA.	1,146	177,575	4	-571	227	-1,273	-1,613	175,962
FE.	3	3,751	1,041	---	44	-4,835	-3,751	---
NCM.	---	4,829	4,478	4	2	-9,313	-4,829	---
T.	3,103	1,199,415	437,983	73,261	26,857	25,573	562,061	1,761,476

See footnotes at end of table, page 16.

Continued--

Footnotes to Table 7

*/ Less than \$500.

1/ Includes adjustment for final demand purchase and sales of scrap, used, and secondhand goods.

Source: The 1960 interindustry transaction in constant 1958 dollars of the Asheville 10-county area were derived from secondary data by application of a set of imputational procedures comprising the ESG "Q" Model. The "Q" Model procedures as well as data sources are discussed in the following publications. Summarized:

"Imputation of Regional Interindustry Structures from Existing Secondary Data," Regional Studies of Income Distribution, Baton Rouge, June 1966.

"A Model for Estimating Regional Economic Structures from Existing Secondary Data," Regional Economic Development, Stillwater, August, 1966.

Presented in detail:

"Q" Model: Aggregation Submodel, ESG Working Paper No. 2. Economic Development Division., Economic Research Service.

"Q" Model: Intermediate Industry Submodel, ESG Working Paper No. 3. Economic Development Division, Economic Research Service, June 1966.

"Q" Model: Personal Consumption Expenditures Submodel, ESG Working Paper No. 4. Economic Development Division, Economic Research Service, March 1966.

"Q" Model: Gross Fixed Capital Formation Submodel, ESG Working Paper No. 5. Economic Development Division, Economic Research Service, June 1966.

"Q" Model: Local Government Expenditures Submodel, ESG Working Paper No. 6. Economic Development Division, Economic Research Service, June 1966.

Note: The data in table 7 differ from those previously reported in that all values based on employment man-years were deflated by a factor of 0.8357 to reflect regional differences in income.

Table 8.--Distribution of output in constant 1958 dollars at producer's prices: Asheville 10-county area, 1960 and U.S. 1958

Sectors	:	Asheville area		:United States
		Mil. dol.	Percent	Percent
Agriculture, forestry, and fisheries	:	97.7	5.5	4.2
Mining.	:	17.4	1.0	1.3
Construction.	:	112.8	6.4	5.6
Manufacturing	:	622.8	35.4	27.2
Durable goods	:	(110.5)	(6.3)	(13.2)
Nondurable goods.	:	(512.3)	(29.1)	(14.0)
Transportation, communication, and	:			
utilities.	:	56.4	3.2	4.9
Wholesale and retail trade.	:	121.7	6.9	7.5
Finance, insurance, and real estate	:	72.1	4.1	6.7
Services.	:	98.6	5.6	6.1
Intermediate sectors.	:	1,199.4	68.1	63.5
Charges against gross area products:	:	562.1	31.9	36.5
Total output, all sectors . . .	:	1,761.5	100.0	100.0

Source: Asheville area data, table 7; U.S. data, U.S. Dept. Commerce Survey of Current Business, Sept. 1965.

The distribution of area receipts is also of interest, particularly as it concerns imports, exports, and nonlocal government activity. Such activity constitutes a major source of potential change in the area's final demand. To emphasize these relationships, a summary of 1960 area domestic output, input, and net exports is presented in table 9.

The three sectors showing the greatest amount of export activity were textile mill products, chemicals and allied products, and other nondurable goods, which together accounted for \$208.4 million or 64 percent of the area's total exports (sales outside the area, net industry basis). 7/

Stated differently, 64 cents of every dollar's worth of area imports is ultimately paid for by the textile mill products, chemical and allied products, and other nondurable goods manufacturing activity in the area. These industries are far more important to the Asheville area than the simple examination of their employment, value added, or sales figures would indicate--less than 21 percent of the area's workers are employed in these sectors, 27 percent of the area's value added originates directly in these sectors, and 25 percent of the area's total sales are made by these sectors.

That the area consumes about 36 percent of the combined output of these sectors indicates that the activity level of these sectors are major influences in the determination of, but are not determined by, the activity levels of the other area industries. These three sectors portray the considerably degree to which the economic health of the area is determined by external demand conditions.

Imports of goods and services constitute a major leakage of the area economy which must ultimately be paid for with area exports. In 1960, \$162.2 million or 57 percent of the area import dollar (net industry basis) went for purchases of minerals, fabricated machinery, motor vehicles and equipment, food and kindred products, and finance, insurance, and real estate services produced outside the area.

Industry Activity Multipliers

An aggregation of the export sales multipliers 8/ derived from table 7 for

7/ Construction activity accounted for an additional \$57.4 million or 18 percent of the area's 1960 exports; this, however, was largely the result of Federal and State expenditures in the area for the construction of Interstate Highway 40, and would not occur on a continuing basis.

8/ Direct and indirect impacts on the area economy other than export sales can be similarly examined; time and space have prevented their detailed consideration in this report.

Table 9.--Domestic output, input, and net exports in constant 1958 dollars at producer's prices:
Asheville 10-county area, 1960

Sectors	Total area domestic output (sales)	Total area domestic input (purchases)	Net competitive imports (-) and exports (+)		
			Value	Percent of	Percent
				industry net	of domestic
			competitive	import and	output
			export sum	1/	
Thousand dollars-					
Agriculture	97,468	70,890	+26,578	+8.2	+27.3
Forestry and fisheries.	258	3,773	-3,515	-1.2	-1,362.4
Mining.	17,351	46,541	-29,190	-9.8	-168.2
Construction.	112,781	55,519	+57,262	+17.7	+50.8
Furniture, lumber, & wood products, mfg.:	52,137	29,797	+22,340	+6.9	+42.8
Primary metal industries, mfg.	1,223	14,949	-13,726	-4.6	-1,122.3
Fabricated metal industries, mfg.	4,039	25,792	-21,753	-7.3	-538.6
Machinery, excluding electrical, mfg.	7,183	25,383	-18,200	-6.1	-253.4
Elec. mach. equip. and supplies, mfg.	23,062	20,139	+2,923	+9	+12.7
Motor vehicles and equipment, mfg.	1,013	28,206	-27,193	-9.1	-2,684.4
Transport, equip., excl. M.V., mfg.	6,341	5,742	+599	+2	+9.4
Other durable goods, mfg.	15,480	27,273	-11,793	-4.0	-76.2
Food and kindred products, mfg.	42,252	81,501	-39,249	-13.1	-92.9
Textile mill products, mfg.	149,610	71,439	+78,171	+24.1	+52.2
Apparel, fabricated textile prod., mfg.	23,001	25,234	-2,233	-.7	-9.7
Printing, publ., & allied products, mfg.	7,161	13,792	-6,631	-2.2	-92.6
Chemicals and allied products, mfg.	113,417	70,778	+42,639	+13.2	+37.6
Other nondurable goods, mfg.	176,891	89,281	+87,610	+27.0	+49.5
Transportation and warehousing.	32,993	43,473	-10,480	-3.5	-31.8
Communications.	9,371	14,102	-4,731	-1.6	-50.5
Utilities and sanitary services	14,034	27,795	-13,761	-4.6	-98.1
Wholesale and retail trade.	121,700	141,110	-19,410	-6.5	-15.9
Finance, insurance, and real estate	72,074	116,931	-44,857	-15.0	-62.2
Business services	7,152	18,273	-11,121	-3.7	-155.5
Repair services	17,647	15,457	+2,190	+7	+12.4
Nondomestic personal services	18,888	16,882	+2,006	+6	+10.6
Entertainment and recreation services	5,056	6,437	-1,381	-.5	-27.3
Medical and educational services, and nonprofit organizations.	27,830	26,075	+1,755	+5	+6.3
Other professional and related services	18,899	21,546	-2,647	-.9	-14.0
Local government enterprises.	3,103	4,311	-1,208	---	-38.9
Total intermediate inputs	1,199,415	1,158,421	+40,994	+12.6	+3.4
Participation income and other value added.	562,061	563,334	-1,273	-.4	78.9
Federal Government enterprises.	0	4,835	-4,835	-1.6	-100.0
Other noncompetitive imports.	0	9,313	-9,313	-3.1	-100.0
Total	1,761,476	1,735,903	+25,573	+7.9	+1.5

1/ Import percentages are based on sum of individual industry net competitive imports (\$283.1 million); export percentages are based on sum of individual industry net exports (\$324.1 million)..

Source: Table 7.

the Asheville area are presented in table 10. ^{9/} Each element in the table indicates the value of sales by each row sector group resulting directly and indirectly for \$1,000 of export sales of each column sector group. ^{10/} The elements on the diagonal include the original \$1,000 of export sales of the column sector group. Since competitive imports are entered endogenously as negative values, the diagonal elements of those sectors with substantial competitive imports are shown to be less than \$1,000. The sum of the values in each column thus indicates the total amount of local activity which under 1960 trade relationships results from the export activity of the sector appearing in the column heading.

Textiles and apparel activity (Group D) with derived domestic activity of \$4,514 for \$1,000 of export sales is the most significant in terms of derived local economic unit impact. This is largely the result of the strong intrasector linkages within the area. Agriculture, forestry, and fisheries (Group A), construction (Group C), and miscellaneous services (Group I), with multiplier values of 3.875, 3.641, and 3.627, respectively, similarly have significant domestic impacts for each unit of export sales. Activity derived from Group A exports results from strong intrasector domestic linkages, while the derived effects associated with Group C and Group I activity are more closely associated with strong linkages with other domestic activity groups. However, the potential for export expansion in these latter groups is limited.

The relatively low multiplier values for sector groups such as mining (Group B) reflect the substantial dependence of the area upon imports competitive with area activity.

Employment by Occupation Multipliers

Particularly meaningful for area welfare and development are the implications of such derived effect linkages on the structure of employment by occupation.

^{9/} The impact multiplier table consists of the inverse of the Leontief matrix adjusted for import leakages, and is derived as

$L^{-1} = [I - A + M]^{-1}$ where I is an identity matrix; A is a matrix of input coefficients obtained from table 7 for each column sector by dividing the value of purchases from each producing (row) sector by the total value of purchases; and M is a diagonal matrix of competitive import coefficients obtained by dividing the value of competitive imports of each area sector by the total value of purchases of that area sector.

^{10/} The values of table 10 are overstated as a result of sector aggregation. Because of the illustrative purpose of this report, the magnitude of this overstatement was not determined nor were procedures to obtain more accurate estimates incorporated. Moreover, feedback effects which might augment the values have been ignored.

Table 10.--Export sales multipliers (value of direct and indirect area sales per \$1,000 of export sales in constant 1958 dollars): Asheville 10-county area, 1960

producing sector group	Sector codes	Exporting sector group										
		A	B	C	D	E	F	G	H	I	J	
A	1,2	1,445	22	109	257	76	100	135	56	91	113	
B	3	17	385	20	20	32	105	10	10	15	18	
C	4	41	7	1,025	28	23	21	14	39	41	31	
D	14,15	95	21	92	1,715	80	100	53	58	112	149	
E	17	103	20	94	264	1,408	138	47	39	86	86	
F	18	160	38	164	180	214	1,318	91	91	153	183	
G	5-13,16	264	75	408	244	232	189	741	146	294	320	
H	19-24,30	591	160	589	610	507	436	282	1,096	616	734	
I	25-29	183	45	187	190	171	134	90	125	1,179	265	
J	FD/PY	976	225	953	1,006	767	665	463	609	1,040	1,668	
Total area economy.		3,875	998	3,641	4,514	3,510	3,206	1,926	2,269	3,627	3,567	

A = Agriculture, forestry, and fisheries;

B = Mining;

C = Construction;

D = Apparel and other textile products;

E = Chemicals and allied products;

F = Paper and allied products, petroleum and coal products, rubber and miscellaneous plastic products, leather products, tobacco manufactures, and not-specified manufactured goods;

G = Food and kindred products, furniture, lumber and wood products, printing, publishing and allied products, primary and fabricated metal products, machinery, motor vehicles and other transportation equipment, stone, clay, and glass products, professional (including photographic) instruments and supplies, and watches, clocks and clockwork-operated devices, and miscellaneous manufactured goods;

H = Transportation, communication, and utilities, wholesale and retail trade, finance, insurance, and real estate, business services, and local government trade and utility enterprises;

I = Repair, nondomestic personal, entertainment and recreational, and professional services;

J = Households, public administration, and public educational services; (personal and local government demand linearly associated with participation income).

Source: See text footnote 9.

Table 11.--Number of direct and indirect employees by occupation and sex required per \$1 million of export sales by industry group: Asheville 10-county area, 1960

[α = Number of employees directly required; β = Number of employees indirectly required;
 Σ = Total number of employees required.]

Occupation group	Export industry group 1/														
	A			B			C			D			E		
	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ
	Number														
Total	102	196	298	42	15	57	67	171	238	79	235	314	41	154	195
Male.	95	136	231	37	73	40	66	111	177	41	149	190	28	100	128
Professional, technical, and kindred workers.	2	9	11	1	2	2	2	7	10	1	9	10	4	9	13
Engineers	0	1	1	0	*	*	1	1	2	*	*	1	1	1	2
Technicians	*	*	*	*	*	*	*	*	*	*	*	1	1	1	2
Lawyers, architects, scientists, and similar workers.	*	*	1	*	*	*	*	*	1	*	*	1	1	1	2
Public relations and personnel workers. . . .	0	*	*	0	*	*	0	*	*	*	*	*	*	*	*
Other professional workers	2	7	9	0	1	1	*	5	6	*	7	7	1	6	7
Managers, officials, and proprietors.	67	43	110	2	3	5	4	20	24	1	31	32	1	16	17
Farm.	67	30	97	0	1	1	0	7	7	0	17	17	0	5	5
Nonfarm	0	13	13	2	2	4	4	13	13	1	14	15	1	11	12
Clerical and kindred workers	*	6	6	1	1	2	1	6	7	2	7	9	1	5	6
Salesworkers.	*	9	9	0	2	2	*	9	9	*	9	9	*	8	8
Craftsmen, foremen, and kindred workers.	1	14	15	5	*	5	41	14	55	7	20	27	6	13	19
Foremen (not elsewhere classified).	*	2	2	2	-1	1	2	2	4	2	4	6	2	2	4
Mechanics and repairmen .	*	5	5	0	1	1	2	5	7	2	7	9	2	5	7
Metal craftsmen	0	1	1	*	*	*	1	1	2	1	2	3	1	1	2
Construction and other craftsmen.	*	6	6	3	-*	3	36	6	42	2	7	9	1	5	6
Operatives and kindred workers:	1	25	26	27	-10	17	7	28	35	24	41	64	12	27	38
Truck drivers & deliverymen	1	6	7	4	-1	3	4	6	10	*	6	6	*	5	5
Assemblers.	0	*	*	0	*	*	0	*	*	0	*	*	0	*	*
Other operatives.	*	19	19	23	-9	14	3	22	25	23	35	58	11	22	33
Service workers, including private household.	0	8	8	*	2	2	*	7	7	1	8	9	*	6	6
Charwomen, janitors, and porters.	0	2	2	*	1	1	*	2	2	1	3	4	*	2	2
Other service workers . .	0	5	5	0	1	1	*	5	5	*	5	5	*	4	4
Laborers.	25	18	43	0	3	3	11	11	22	2	14	16	1	8	9
Farm.	25	11	36	0	1	1	0	3	3	0	6	6	0	2	2
Nonfarm	0	7	7	0	2	2	11	8	19	2	8	10	1	6	7
Occupations not reported. .	*	5	5	2	*	2	1	6	7	5	9	14	4	6	10

See footnotes at end of table, page 25.

Continued--

Table 11.--Number of direct and indirect employees by occupation and sex required per \$1 million of export sales by industry group: Asheville 10-county area, 1960--Continued

[α = Number of employees directly required; β = Number of employees indirectly required;
 Σ = Total number of employees required.]

Occupation group	Export industry group 1/														
	F			G			H			I			J		
	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ
	Number														
Total	45	138	183	72	59	181	99	72	171	161	166	327	22	191	213
Male	36	91	127	58	36	94	68	45	113	86	106	192	7	124	131
Professional, technical, and kindred workers	3	6	9	3	3	6	2	6	7	23	8	31	3	9	12
Engineers	1	*	2	1	—*	1	*	*	*	1	1	2	*	1	1
Technicians	*	*	*	*	*	*	*	*	*	2	*	2	*	*	1
Lawyers, architects, scientists, and similar workers	1	1	2	*	*	*	*	1	1	4	1	5	*	*	1
Public relations and personnel workers	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Other professional workers	*	4	4	1	3	4	1	4	5	16	6	22	2	7	9
Managers, officials, and proprietors	1	17	18	4	14	18	15	8	23	7	19	26	1	23	24
Farm	0	7	7	0	9	9	0	4	4	0	6	6	0	8	8
Nonfarm	1	10	11	4	5	9	15	4	19	7	13	20	1	15	16
Clerical and kindred workers	2	5	7	2	2	4	4	3	7	2	6	8	2	6	8
Salesworkers	*	6	7	2	4	6	14	2	16	1	9	10	*	11	11
Craftsmen, foremen, and kindred workers	7	12	19	9	3	12	8	6	15	16	14	29	1	16	17
Foremen (not elsewhere classified)	2	2	4	2	*	2	1	1	2	*	2	2	*	1	2
Mechanics and repairmen	2	4	6	1	2	3	4	2	6	10	5	15	*	7	7
Metal craftsmen	1	1	2	2	—*	2	2	*	*	1	*	1	0	1	1
Construction and other craftsmen	2	5	7	4	1	5	3	3	6	5	6	11	*	7	7
Operatives and kindred workers	19	26	44	26	2	28	16	11	27	9	26	35	1	29	30
Truck drivers & deliverymen	*	5	5	4	1	5	7	2	9	2	6	8	*	6	7
Assemblers	*	*	*	1	—*	1	*	*	*	0	*	*	0	*	*
Other operatives	18	21	39	21	1	22	9	9	18	7	27	20	*	23	23
Service workers, including private household	1	6	6	1	3	4	3	4	7	20	7	27	2	9	11
Charwomen, janitors, and porters	*	2	2	*	1	1	1	1	2	4	2	6	1	3	4
Other service workers	*	4	4	1	2	3	2	3	5	16	5	21	1	6	7
Laborers	2	8	10	9	3	12	4	4	8	6	9	15	*	11	11
Farm	0	3	3	0	3	3	0	1	1	0	2	2	0	3	3
Nonfarm	2	5	7	9	—*	9	4	3	7	6	7	13	*	8	8
Occupations not reported	4	5	9	4	1	5	3	2	5	3	5	8	*	6	6

See footnotes at end of table, page 25.

Continued--

Table 11.--Number of direct and indirect employees by occupation and sex required per \$1 million of export sales by industry group: Asheville 10-county area, 1960--Continued

[α = Number of employees directly required; β = Number of employees indirectly required;
 Σ = Total number of employees required.]

Occupation group	Export industry group 1/														
	A			B			C			D			E		
	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ
	Number														
Female	8	63	71	5	12	17	2	62	64	38	89	127	15	57	72
Professional, technical, and kindred workers	1	9	10	0	3	3	0	9	9	1	10	11	1	9	10
Technicians	*	*	1	0	*	*	0	*	*	*	*	1	1	1	2
Lawyers, architects, scientists, and similar workers	0	*	*	0	*	*	0	*	*	0	*	*	0	*	*
Public relations and personnel workers	0	*	*	0	*	*	0	*	*	0	*	*	0	*	*
Engineers and other professional workers	*	8	8	0	2	2	0	8	8	*	9	9	*	7	7
Managers, officials, and proprietors	3	3	6	0	*	*	*	2	2	*	3	3	*	2	2
Farm	3	1	4	0	*	*	0	*	*	0	1	1	0	*	*
Nonfarm	0	2	2	0	*	*	*	2	2	*	2	2	*	2	2
Clerical and kindred workers	1	13	14	*	3	3	1	14	15	3	15	18	2	12	14
Secretaries, stenographers, and typists	*	4	4	0	1	1	*	5	5	1	5	6	1	4	5
Other clerical workers	*	9	9	*	2	2	1	9	10	2	10	12	1	8	9
Salesworkers	*	6	6	0	2	2	*	6	6	*	6	6	0	5	5
Craftsmen, foremen, and kindred workers	0	1	1	*	1	1	*	1	1	1	1	2	*	*	1
Foremen (not elsewhere classified)	0	*	*	*	*	*	0	*	*	1	1	2	*	*	*
Mechanics and repairmen, metal craftsmen, and construction & other craftsmen	0	*	*	0	*	*	*	*	*	*	*	*	*	*	*
Operatives and kindred workers	1	10	11	5	-1	4	*	10	10	31	30	61	6	10	16
Assemblers	0	1	1	0	*	*	0	1	1	*	*	1	0	*	*
Truck drivers, deliverymen and other operatives	1	9	10	5	-1	4	*	9	9	31	29	60	6	10	16
Service workers, including private household	*	15	15	0	4	4	*	15	15	*	15	15	1	12	13
Charwomen, janitors, and porters	0	*	*	0	*	*	0	*	*	0	*	*	*	*	*
Other service workers	*	15	15	0	4	4	*	15	15	*	15	15	1	12	12
Laborers	3	1	4	0	*	*	0	*	*	*	1	1	*	*	1
Farm	3	1	4	0	*	*	0	*	*	0	1	1	0	*	*
Nonfarm	0	*	*	0	*	*	0	*	*	*	*	*	*	*	*
Occupations not reported	0	3	3	0	1	1	0	4	4	3	6	9	4	4	8

See footnotes at end of table, page 25.

Continued--

Table 11.--Number of direct and indirect employees by occupation and sex required per \$1 million of export sales by industry group: Asheville 10-county area, 1960--Continued

[α = Number of employees directly required; β = Number of employees indirectly required;
 Σ = Total number of employees required.]

Occupation group	Export industry 1/														
	F			G			H			I			J		
	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ	α	β	Σ
	Number														
Female	9	47	56	15	22	37	32	26	58	77	59	136	16	68	84
Professional, technical, and															
kindred workers	1	7	7	1	5	5	1	6	7	21	10	31	6	9	15
Technicians	*	*	*	*	*	*	*	*	*	2	*	2	*	1	1
Lawyers, architects,															
scientists, and similar															
workers	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Public relations and															
personnel workers	0	*	*	0	*	*	0	*	*	*	*	*	*	*	*
Engineers and other pro-															
fessional workers	*	6	6	*	4	4	*	5	5	19	9	28	5	8	13
Managers, officials, and															
proprietors	*	1	1	*	1	1	2	1	3	3	2	5	*	2	2
Farm	0	*	*	0	*	*	0	*	*	0	*	*	0	*	*
Nonfarm	*	1	1	*	1	1	2	1	3	3	2	5	*	2	2
Clerical and kindred workers	2	10	12	4	4	8	11	5	16	15	13	28	2	16	18
Secretaries, stenographers,															
and typists	1	3	4	2	1	3	2	2	4	7	4	11	1	5	6
Other clerical workers . .	1	7	8	2	3	5	9	3	12	8	9	17	1	11	12
Salesworkers	0	4	4	*	3	3	10	1	11	*	6	6	0	7	7
Craftsmen, foremen, and															
kindred workers	*	*	1	*	*	1	*	*	*	*	*	1	*	*	*
Foremen (not elsewhere															
classified)	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*
Mechanics and repairmen,															
metal craftsmen, and con-															
struction & other craftsmen	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Operatives and kindred workers	6	9	15	8	1	9	1	5	6	9	10	19	*	12	12
Assemblers	*	*	*	2	-1	1	*	*	*	0	1	1	0	1	1
Truck drivers, deliverymen,															
and other operatives . . .	6	9	15	6	2	8	1	5	6	9	9	18	*	11	11
Service workers, including															
private household	*	10	10	*	7	7	5	8	13	23	15	38	8	15	23
Charwomen, janitors, and															
porters	0	*	*	*	*	*	*	*	*	1	*	1	*	*	*
Other service workers . . .	*	10	10	*	7	7	5	8	13	22	15	37	8	15	23
Laborers	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Farm	0	*	*	0	*	*	0	*	*	0	*	*	0	*	*
Nonfarm	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Occupations not reported . .	1	3	4	2	1	3	2	1	3	4	3	7	*	3	4

* Less than 0.5 worker.

1/ For sector equivalents of export industry groups, see table 10.

Source: See text footnote 11.

Note: Detailed figures may not sum to totals due to rounding.

Table 11 shows the extension of the multiplier matrix to the requirements for employment by occupation. ^{11/} Interpretation of the data presented in this table may be facilitated through example.

The three columns under Group A show the direct and indirect employment required for each \$1 million of 1960 agriculture, forestry, and fisheries export sales. The first column shows that in the production of this quantity of exports, the sector directly employed 102 workers of whom 95 were male and eight were female. ^{12/} Of the 95 male workers, there were 67 farm managers or proprietors, 25 farm laborers, two other professional workers, one truck driver, and one construction or other craftsman. The female workers comprised three managers or proprietors, three farm laborers, one clerical worker, and one truck driver or other type of operative.

Column 2 indicates that 196 additional workers were employed in producing goods and services indirectly required by the agriculture, forestry, and fisheries sector or its employees for each \$1 million of export sales.

The third column presents total employment by occupation directly and indirectly associated with the \$1 million of export sales, and is equivalent to the sum of columns 1 and 2.

The derived employment characteristics of other sectors in the area economy are similarly indicated. The dependence of mining (Group B), other manufacturing (Group G), and distributive and financial services (Group H) upon competitive imports to provide much of their locally available output is again in evidence. For example, 15 additional workers were employed in producing goods and services indirectly required by the mining sector and its employees in producing each \$1 million of output. This is primarily the consequence of negative employment entries which reflect the competitive mineral imports which serve to offset the domestic mining activity.

Direct domestic employment requirements for each dollar of exports are greatest for miscellaneous services (Group I), agriculture, forestry and fisheries (Group A), and distributive and financial services (Group H). The

^{11/} The employment extensions of the multiplier matrix are derived from the equations

$$N_{\Sigma} = N_{\alpha} L^{-1} \quad \text{and} \quad N_{\beta} = N_{\Sigma} - N_{\alpha}$$

where N_{Σ} is the matrix of total direct and indirect employment requirements by occupation and sex per \$1 million of export sales; N_{α} is a matrix of employment requirements by occupation and sex directly required by each sector derived by dividing actual numbers of employees of each sector by the value of that sector's total purchases, and scaling the resulting unit coefficients to the \$1 million level; L^{-1} is the impact multiplier matrix as defined in footnote 9; and N_{β} is the matrix of indirect employment requirements by occupation and sex.

^{12/} Detailed figures may not sum to totals due to rounding.

greatest number of total jobs for each dollar of exports, however, is associated with the activity of the textiles and apparel manufacturing (Group D), agriculture, forestry, and fisheries (Group A), and miscellaneous services (Group I).

In 1960, \$1 million of textile and apparel exports directly resulted in the area employment of 79 workers (tables 10 and 11). The production of the \$3,514,000 of area goods and services used in producing these exports resulted in the additional employment of 235 workers. Total area activity for \$1 million of apparel and textile exports thus directly and indirectly amounted to \$4,514,000. With data derived from table 7, we find that this \$4,514,000 included \$1,006,000 of payments to workers employed in the area, of which \$235,000 directly accrued to the 79 textile and apparel workers, and \$771,000 accrued to the 235 indirectly associated workers. These data indicate 1960 income for each employee engaged in textile and apparel manufacture to have been \$2,975; while income for each employee for workers indirectly associated with the textile and apparel sector was \$3,281 or about 10 percent greater. This differential in income for each employee reveals the higher proportion of male and of skilled workers employed by the area sectors indirectly engaged in textile and apparel production. This phenomenon is also shown in table 11 for the textile and apparel sector as well as other sectors of the Asheville area.

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